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Fertilizer Operations of Regional and Interregional Cooperatives, 1984



Abstract

Fertilizer Operations of Regional and Interregional Cooperatives, 1984

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This study documents the fertilizer operations of regional and interregional cooperatives in the United States. The findings provide 1984 data on sales, market share, production, capacity, inputs, and markets for the largest regional and interregional cooperatives involved in the fertilizer industry. Twenty-four cooperatives provided data for this report, based on their fiscal years ending during calendar year 1984. Participating cooperatives, including two interregionals and twenty-two regionals, represent the vast majority of fertilizer products flowing through the cooperative system at the manufacturing and wholesaling level. Data from earlier studies and secondary data from various public sources form the basis for analysis of trends between 1970 and 1984.

Key words: Cooperatives, fertilizer, inputs, regionals, interregionals.

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Preface

This study was designed to document the fertilizer manufacturing and distribution activities of regional and interregional cooperatives in the United States. The findings provide 1984 data on sales, market share, production, capacity, inputs, and markets for the largest regional and interregional cooperatives involved in the fertilizer industry.

Twenty-four cooperatives provided data for this report, based on their fiscal years ending during calendar year 1984. Participating cooperatives, including 2 interregionals and 22 regionals are listed in appendix table 1. While the 24 cooperatives are not the universe of regional and interregionals handling fertilizer products, those excluded represent such small volume that no significant change in this study's findings would result from their inclusion.

The last study of cooperative fertilizer operations by ACS was published in 1973, using 1970 data. Data from that study, along with data primarily from USDA's National Agricultural Statistical Service, U.S. Department of Commerce, and Tennessee Valley Authority form the basis for discussion of changes and trends between 1970 and 1984. Thirty-nine cooperatives were surveyed in the 1970 study, 22 of which were included in the 1984 survey. The fertilizer operations of 7 of the 39 were absorbed by cooperatives included in the 1984 survey. Volumes handled by the remaining 10 cooperatives in the 1970 group were quite small. Thus, data in the 1970 and 1984 surveys are largely comparable, except where explicitly noted.

Contents

HIGHLIGHTS	v
FERTILIZER INDUSTRY OVERVIEW, 1970 TO 1984	1
Fertilizer Consumption.....	1
Foreign Trade	2
Fertilizer Prices	2
Industry Structure	3
OVERVIEW OF THE COOPERATIVES' FERTILIZER SYSTEM ...	4
COOPERATIVE SALES OF FERTILIZER PRODUCTS.....	5
Gross Sales	5
Net Sales and Share of Market	6
Marketing and Distribution Channels	7
Wholesale Cooperative Sources of Fertilizer Products	9
PRODUCTION OF FERTILIZER PRODUCTS	10
Product Volume	10
Number of Plants.....	12
Capacity and Utilization.....	12
CHALLENGES FOR FERTILIZER COOPERATIVES.....	13
Competing in a Mature Market.....	13
Improved Vertical Coordination.....	14
Improved Horizontal Coordination	14

Highlights

This study was designed to document the fertilizer operations of largest 24 regional and interregional fertilizer cooperatives in the U.S. The findings provide 1984 data on sales, market share, production, capacity, inputs, and outlets for the largest regional and interregional cooperatives involved in the fertilizer industry.

Cooperatives are involved along the entire vertical chain of the fertilizer industry, from mining and manufacturing through onfarm applications and exports. In 1984, a total of 3,442 farmer-owned cooperatives reported sales of fertilizer products, down from 4,294 in 1970. Net cooperative sales of fertilizer (excluding intercooperative sales) were valued at \$3.4 billion in 1984, more than five times the \$650 million in fertilizer sales in 1970. Cooperatives' share of farm expenditures on fertilizers (including lime) rose from 27 percent in 1970 to 38 percent in 1984.

The 24 cooperatives sold a total of 22.4 million tons of fertilizer in 1984, 48 percent more than in 1970 (table 5). Nitrogen fertilizer products accounted for the largest portion of gross cooperative tonnage, with sales of 10.8 million tons or 48.2 percent of total gross sales. Phosphate products (excluding most ammonium phosphates) accounted for 4.4 percent of gross tonnage; potash products, 19.1 percent; and mixtures and blends (including most ammonium phosphates), 28.3 percent.

Survey cooperatives had their largest tonnage increases in the nitrogen products group, with tonnage sales increasing 195 percent. Urea tonnage growth led the way, followed by nitrogen solutions and anhydrous ammonia. Ammonium nitrate was the only major nitrogen product for which cooperatives experienced a decline in tons sold.

Sales of potash, primarily muriate, also increased substantially, from 2.6 million tons in 1970 to 4.3 million tons in 1984. In the phosphate products group, declines in tonnage were experienced across the board, with the single exception of a minor product for cooperatives, super phosphoric acid. Total tonnage of phosphate products (excluding most ammonium phosphates) fell 42 percent, nearly the same as occurred in domestic consumption. Total tonnage of mixtures and blends increased 22.4 percent, solely on the strength of increases in 18-46-0, which experienced a 127.1 percent increase.

On average, the three manufacturing cooperatives sold 4.1 million tons of fertilizers in 1984. The average sold by cooperative wholesalers was 487,000 tons, about 10 percent of the volume of the three manufacturers. As a proportion of total tonnage, the nitrogen products group was relatively more important than potash for the three manufacturers than for the 21 wholesalers (54 percent versus 41 percent).

Cooperatives sold a net 15.6 million tons of fertilizer products in 1984 (sales to organizations outside the survey group), representing 33 percent of U.S. consumption of fertilizer products, up from 27 percent in 1970. Cooperatives' largest role in the fertilizer industry came in the basic materials group. Here they sold a net 10.9 million tons in 1984 for a 41-percent share, up from 36 percent in 1970. Cooperatives had the largest share of potash, with 49 percent of the domestic final user market. Cooperatives increased their share of all basic materials during the 1970 to 1984 period, achieving a 38-percent share for nitrogen and a 44-percent share in phosphate.

Retail outlets owned by local cooperatives were by far the most important channel through which the survey cooperatives sold fertilizer products in 1984. These outlets received 11.4 million tons of fertilizer, representing 73.1 percent of total net sales tonnage of the survey group. Most survey cooperatives sold

products to local cooperative outlets. Sixteen cooperatives sold 2.6 million tons of fertilizer product to end users (primarily farmers), or 16.5 percent of total net sales, mostly through regional-owned branch stores.

Cooperative manufacturers were the primary source of fertilizer products sold by cooperative wholesalers and by the manufacturers in their wholesale and retail operations. In 1984, the 21 cooperative wholesalers bought 76.8 percent of the 9.8 million product tons they purchased from cooperatives, predominantly from the three manufacturers.

Wholesalers are highly dependent on cooperative manufacturers for their anhydrous ammonia. They acquired 95.5 percent of their 1.14 million tons purchased from the three manufacturers in 1984. In total, cooperative wholesalers bought 80.9 percent of their nitrogen products from other cooperatives. They acquired 71.2 percent of their phosphate products, 74.9 percent of their potash products, and 77.9 percent of their mixtures and blends through the cooperative system.

Cooperatives in the survey produced 20.5 million tons of fertilizer and related products in 1984. They produced a total 6.4 million tons of basic materials (anhydrous ammonia and phosphoric acid) in 1984. This was 29.8 percent higher than the tonnage produced in 1970. Cooperatives' share of U.S. production of anhydrous ammonia rose by 5 percent to 25 percent between 1970 and 1984. Cooperatives' share of phosphoric acid production was cut in half, to 14 percent during the same period.

Cooperatives produced a total of 3.9 million tons of intermediate nitrogen fertilizer products in 1984, up 84.4 percent from 1970. Urea (1.5 million tons) and nitrogen solutions (1.5 million tons) were the most important of these products. Cooperatives produced over one-third of total U.S. production of solid urea and ammonium nitrate in 1984, but only 13 percent of total U.S. production of nitrogen solutions.

Total cooperative production of intermediate phosphate products fell slightly between 1970 and 1984, from 2.96 million to 2.87 million tons. Production of diammonium phosphate increased significantly, however, from 1.29 million to 2.2 million tons in 1984. Cooperatives' share of U.S. intermediate phosphate production remained lower than for intermediate nitrogen products, at a weighted average of 17 percent.

Survey cooperatives operated 20 plants for the production of basic materials, 14 of which were for anhydrous ammonia. One manufacturer owned a potash facility, but held it out of operation. Cooperatives owned 40 plants for the production of intermediate fertilizers and 284 mixing and blending plants, 238 of which were for bulk blends.

Between 1970 and 1984, cooperative anhydrous ammonia capacity increased 52 percent, to 4.69 million tons in 1984, representing 27 percent of U.S. capacity. While cooperative phosphoric acid capacity rose nearly 68 percent, to 4.12 million tons, to their share of U.S. capacity held steady at 22 percent.

Fertilizer Operations of Regional and Interregional Cooperatives, 1984

John R. Dunn
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FERTILIZER INDUSTRY OVERVIEW, 1970 TO 1984

The years between 1970 and 1984 saw sharp increases in world consumption of the three major fertilizer nutrients (table 1). These increases were the result of a number of factors, including population growth, adoption of modern

¹ Program Leader-Farm Supplies, and Agricultural Economist, respectively.

Table 1—World consumption of primary plant nutrients¹

Year	Nitrogen (N ₂)	Phosphate (P ₂ O ₅)	Potash (K ₂ O)
----- 1,000 metric tons -----			
1984 ²	66,906	32,856	25,408
1983	61,021	30,593	22,899
1982	60,310	30,798	23,741
1981	60,727	31,557	24,226
1980	57,168	31,089	23,943
1979	53,749	30,626	24,457
1978	49,784	28,529	22,904
1977	45,115	27,301	23,161
1976	43,140	25,265	21,585
1975	38,596	23,922	19,856
1974	38,739	24,126	20,859
1973	35,711	22,477	18,802
1972	33,348	21,098	17,625
1971	31,767	19,843	16,670
1970	28,691	18,818	15,469

¹Year ending June 30.

²Forecasts

Source: FAO Fertilizer Yearbook, annual issues.

agronomic practices in many developing countries, development goals of centrally planned economies, and use promotion and stimulus by various national and international development organizations.

Fertilizer Consumption

World consumption of nitrogen fertilizer increased by 133 percent between 1970 and 1983, reaching 67 million nutrient tons. Phosphate consumption grew to nearly 33 million nutrient tons, a 75-percent increase. Potash consumption increased a smaller 64 percent to 25 million nutrient tons in 1983. Nitrogen consumption grew fairly steadily throughout the 14-year period. Phosphate and potash consumption grew rapidly in the early to mid 1970's, but tapered off in the late 1970's and early 1980's.

U.S. fertilizer consumption followed a similar pattern (table 2). U.S. consumption of nitrogen increased by 60 percent to 11 million nutrient tons. Phosphate consumption increased a negligible 7 percent to 4.9 million nutrient tons, in contrast with the much larger growth in world consumption. Potash consumption increased by 44 percent to nearly 5.8 million nutrient tons. For all three major nutrients, growth in U.S. consumption was concentrated in the 1970's. Each experienced declines in the 1980's, a result of farm programs, continued economic stress in the farming sector, and the evolution of the domestic fertilizer industry out of its growth phase into maturity.

Data in table 2 show changes in the nature of domestic demand for various types of fertilizer products over the past 15 years. Use of high analysis nitrogen products, notably anhydrous ammonia, has become predominant, a likely result of suitability to larger scale farming

operations and lower cost per unit of nitrogen. The use of straight phosphate material has declined significantly, in favor of bulk blends containing phosphates and other materials. Finally, the importance of nitrogen and potash relative to phosphates has increased.

Foreign Trade

The role of foreign trade in the U.S. fertilizer industry grew significantly between 1970 and 1984 (table 3). On balance, the U.S. trade position became increasingly that of a net importer, though there were considerable differences between individual fertilizer materials and products.

The U.S. increased nitrogen exports by 56.6 percent while increasing imports by 360.8 percent. Nitrogen export increases were largely a result of exports of diammonium phosphate. Imports of anhydrous ammonia were primarily responsible for the large increase in nitrogen imports, as many countries with abundant natural gas resources, including the Soviet Union and Mexico, began major efforts to penetrate the U.S. market.

Potash imports, primarily from Canada, nearly doubled

while exports of potash containing products remained fairly static. Phosphate trade remained the singular bright spot for U.S. exporters, with imports declining and exports increasing by 415 percent. Diammonium phosphate, a particularly attractive product for the farming sectors in developing and underdeveloped countries, led the large increase in U.S. phosphate exports.

In foreign trade terms, the 1970-84 period may be viewed in two parts. The first, 1970 to 1978-79 was a period of export growth due to significant U.S. capacity and a low valued dollar. In the second period, this trend was reversed as the U.S. dollar rose in value and U.S. interest rates soared. Of more long term concern to the U.S. fertilizer industry, the capacity to produce fertilizer products grew rapidly in many competing countries and former importing countries.

Fertilizer Prices

Fertilizer prices between 1970 and 1984 generally tracked the upward price trends in other agricultural inputs and the overall rate of inflation. Taken as a group, fertilizer prices tripled between 1970 and 1981, and leveled off or

Table 2—U.S. fertilizer consumption, selected years, 1970-1984¹

Product	1970	1975	1980	1984	Change, 1970-84
<i>Nutrients:</i>	<i>-----1,000 nutrient tons-----</i>				<i>Percent</i>
Nitrogen (N ₂)	7,458	8,601	11,407	11,092	59.6
Phosphate(P ₂ O ₅)	4,574	4,507	5,413	4,901	7.2
Potash (K ₂ O)	4,036	4,453	6,245	5,797	43.6
Total	16,068	17,561	23,083	21,790	35.6
<i>Straight materials:</i>	<i>-----1,000 product tons-----</i>				
Nitrogen	11,898	14,155	19,053	19,619	64.9
Phosphate	2,522	2,212	2,230	1,474	-42.5
Potash	2,410	3,244	5,542	5,582	131.6
Mixtures and blends	20,961	20,647	23,270	21,174	1.0
Other ²	1,798	2,226	2,602	2,207	22.8
Total products	39,589	42,484	52,787	50,056	26.4
<i>Average analysis:³</i>	<i>-----Percent-----</i>				
Nitrogen	19.7	21.3	22.8	23.2	
Phosphate	12.1	11.2	10.8	10.2	
Potash	10.7	11.1	12.4	12.1	

¹Fertilizer year ending June 30.

²Natural organic and micronutrient materials

³Nutrient tons divided by total product less "other"

declined after that. While prices did rise significantly over this period, they maintained or improved upon their parity with the prices of other agricultural inputs, most notably energy, machinery, and financial assets.

As has been the case historically, the trend in fertilizer prices has not been smooth. Manufacturers, responding to increasing prices after the 1972 lifting of price controls, increased capacity to the point of overcapacity. This situation led to downward price adjustments between 1975 and 1978. After another period of rapid price increases between 1978 and 1981, the post-1981 period saw a leveling of prices, including some declines, due to the abatement of inflation, increasing import competition, farm programs such as the 1983 Payment-In-Kind Program, and overcapacity.

Industry Structure

Response by U.S. manufacturers to these recent pressures

and the overall volatility of the fertilizer industry over the past 15 years has been the temporary closing and permanent shutdown of plant and mining capacity. Many fertilizer manufacturers left the business entirely while others consolidated. The number of ammonia producers in the U.S. dropped from 59 in 1970 to 43 in 1984 and capacity, which peaked in 1978 at 22 million tons, fell 14 percent by 1984. The closure of 27 plants left the U.S. ammonia industry with a 1984 capacity less than 1 million tons higher than in 1970. The number of U.S. producers of phosphate acid dropped from 27 in 1970 to 19 in 1984. U.S. potash capacity dropped 43 percent over the same period.

In summary, the industry environment faced by cooperative fertilizer manufacturers and wholesalers over the 1970 to 1984 period may be characterized by its volatility, maturation of domestic markets, consolidation, and internationalization. These characteristics may be expected to continue over the foreseeable future.

Table 3—U.S. imports and exports of fertilizer nutrients, 1970 to 1984.

Nutrient	1970	1975	1980	1984
<i>1,000 nutrient tons</i>				
Nitrogen:				
Imports	855	1,198	2,566	3,940
Exports	<u>1,328</u>	<u>1,115</u>	<u>2,638</u>	<u>2,080</u>
Balance ¹	473	(83)	72	(1,860)
Phosphoric acid: ²				
Imports	273	274	239	121
Exports	<u>845</u>	<u>1,861</u>	<u>3,925</u>	<u>4,353</u>
Balance	572	1,587	3,686	4,232
Potassium oxide:				
Imports	2,646	3,847	5,403	5,164
Exports	<u>681</u>	<u>848</u>	<u>1,048</u>	<u>528</u>
Balance	(1,965)	(2,999)	(4,355)	(4,636)
All nutrients:				
Imports	3,774	5,319	8,208	9,225
Exports	<u>2,854</u>	<u>3,824</u>	<u>7,611</u>	<u>6,961</u>
Balance	(920)	(1,495)	(597)	(2,264)

¹Numbers in parentheses indicate net import balance.

²Excludes phosphate rock.

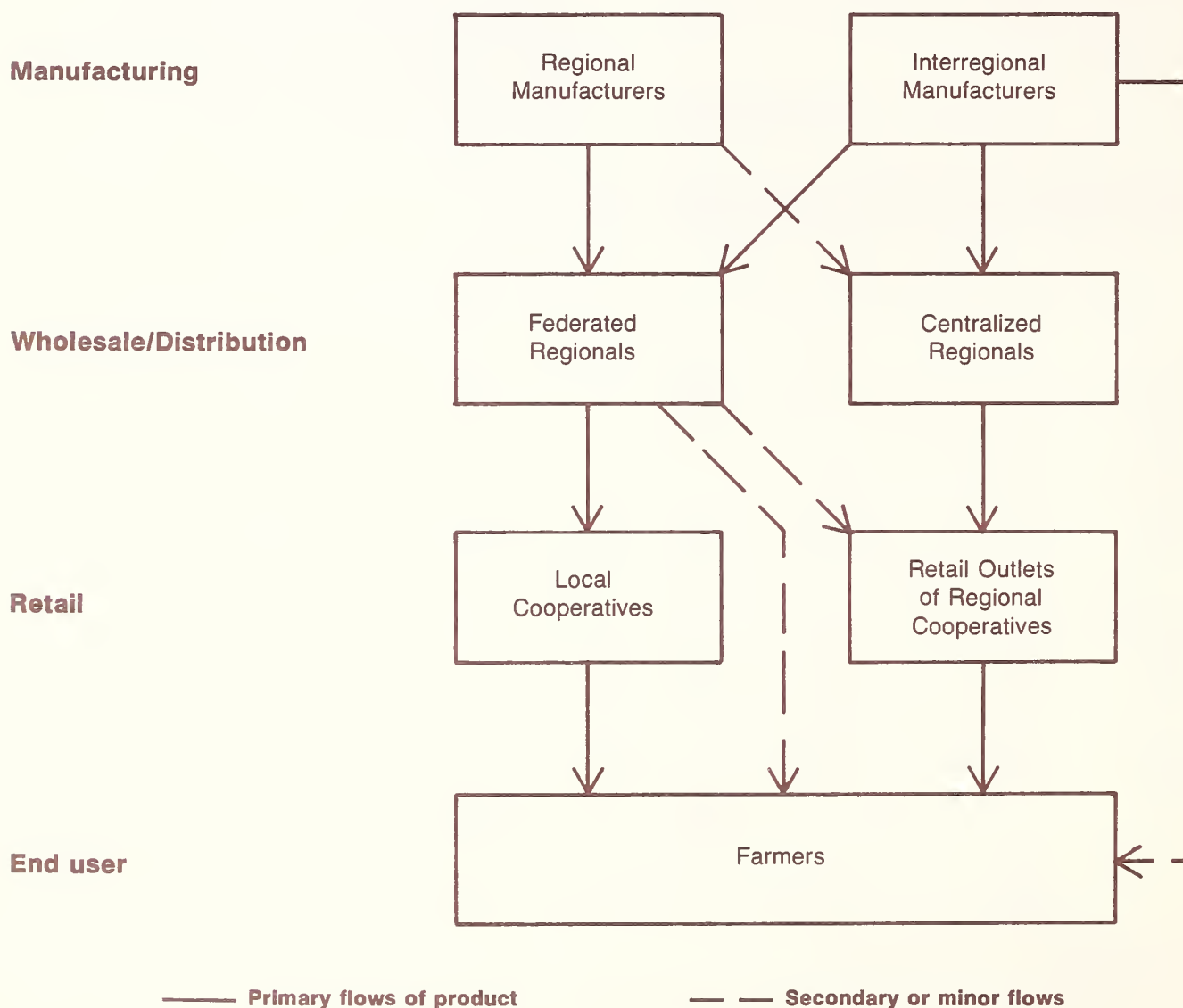
Source: USDA, Agricultural Stabilization and Conservation Service for years ending 6/30.

OVERVIEW OF THE COOPERATIVES' FERTILIZER SYSTEM

The cooperative fertilizer system in the U.S. is composed of more than 3,400 autonomous local, regional, and interregional organizations. Cooperatives are involved along the entire vertical chain of the industry, from mining and manufacturing through on farm applications and exports. A schematic drawing of the system is shown in figure 1.

The cooperative fertilizer chain begins in mining and manufacturing, activities performed in the cooperative system almost exclusively by two interregionals, CF Industries and Mississippi Chemical Corp, and one regional, Farmland Industries. Wholesalers may be involved in blending or mixing some fertilizer products, may provide storage and transportation services, and are involved in an array of product sales, support, and research activities. Wholesaling cooperatives are either federated regionals owned and controlled by local

Figure 1-The Cooperatives' Fertilizer System: Flows of Fertilizer Products



cooperatives, or centralized regionals owned and controlled directly by farmers, though many regionals have structures that are a mix of the two.

Wholesalers sell or transfer fertilizer products to local or company-owned outlets, which then sell the products to farmers, sometimes providing application services and frequently providing various testing and advisory services.

While this drawing shows the general relationships in the cooperatives' fertilizer system, it is not complete. Wholesaling cooperatives and many local cooperatives get at least a portion of their fertilizer products from noncooperative sources. Most wholesaling cooperatives sell a portion of their product volume to noncooperative wholesale or retail outlets. Many of the regionals have a mixed structure, with membership composed of both farmers and local cooperatives. Several federated cooperatives operate their own retail outlets and sell directly to farmers. Centralized regionals frequently sell products to local cooperatives, which may have an affiliation or strictly a customer relationship with the regional. Finally, a limited amount of fertilizer is sold directly to farmers by manufacturing cooperatives.

Of the 24 cooperatives surveyed for this study, 2 are interregionals (owned by regionals), 10 are pure federated regionals, 2 are pure centralized regionals, and the remaining 10 have varying mixed structures with both farmers and local cooperative members.

In 1984, a total of 3,442 farmer-owned cooperatives reported sales of fertilizer products (table 4), down from 4,294 in 1970. The decrease in cooperative numbers

reflects the trends in merger, consolidation, and bankruptcy occurring in all cooperatives and firms in the agribusiness sector over this period. Net cooperative sales of fertilizer (excluding intercooperative sales) were valued at \$3.4 billion in 1984, a more than 400-percent increase over the \$650 million in fertilizer sales in 1970. Cooperative share of farm expenditures on fertilizers (including lime) rose from 27 percent in 1970 to 38 percent in 1984.

COOPERATIVE SALES OF FERTILIZER PRODUCTS

Gross Sales

The 24 cooperatives sold a total of 22.4 million tons of fertilizer in 1984, 48 percent more than in 1970 (table 5). This figure includes all sales to cooperative and noncooperative buyers except exports. Two cooperatives reported limited export activities. Nitrogen fertilizer products accounted for the largest portion of gross cooperative tonnage, with sales of 10.8 million tons, or 48.2 percent of total gross sales. Phosphate products (excluding most ammonium phosphates) accounted for 4.4 percent of gross tonnage, potash products, 19.1 percent, and mixtures and blends (including most ammonium phosphates), 28.3 percent.

Survey cooperatives had their largest increases in the nitrogen products group, with tonnage sales increasing 195 percent. Urea tonnage growth led the way with a nearly ninefold increase, followed by nitrogen solutions and anhydrous ammonia. Ammonium nitrate was the only

Table 4-U.S. cooperatives' role in providing fertilizer to farms, 1970, 1975, 1980, and 1984

Measure	1970	1975	1980	1984	Change, 1970-84
<i>Number</i>					
Cooperatives handlers ¹	4,294	3,840	3,802	3,442	-19.8
<i>Million dollars</i>					
Cooperative sales ¹	650	1,894	3,450	3,400	423.1
Farm expenditures ²	2,435	6,660	9,490	8,896	265.5
<i>Percent</i>					
Cooperatives' share of farm expenditures	27	28	36	38	

¹USDA, Agricultural Cooperative Service, annual survey

²USDA, Statistical Reporting Service

Note: Cooperative data based on fiscal years ending during indicated calendar years.

Table 5—Gross sales of fertilizer products, 1970 and 1984

Product	1970	1984	Change 1970-84
	-----1,000	tons-----	Percent
Nitrogen:			
Anhydrous ammonia	1,776	3,320	86.9
Nitrogen solutions	979	3,119	218.6
Urea (solid)	301	2,657	782.7
Ammonium nitrate	1,997	1,431	-28.3
Other	478	282	-41.0
Total nitrogen	5,531	10,809	95.4
Phosphate:			
Phosphoric acid:			
Wet process	353	5	-98.6
Super	13	48	269.2
Triple superphosphate	1,078	806	-25.2
Selected ammonium phosphate	113	99	-12.4
Other	146	30	-79.5
Total phosphates	1,703	988	-42.0
Potash:			
Muriate	2,561	4,218	64.7
Other	78	57	-26.9
Total potash	2,639	4,275	62.0
Dry mixtures:			
18-46-0	1,564	3,551	127.1
Other ammonium phosphate	349	296	-15.2
Other	2,636	1,216	-53.9
Liquid mixtures:			
10-34-0	n.a.	267	—
Other	90	65	-27.8
Bulk blends	553	959	73.4
Total mixtures, blends	5,192	6,354	22.4
Total all fertilizers	15,065	22,426	48.9

major nitrogen product for which cooperatives experienced a decline in tons sold.

Sales of potash, primarily muriate, also increased substantially, from 2.6 million tons in 1970 to 4.3 million tons in 1984. In the phosphate products group, declines in tonnage were experienced across the board, with the single exception of a minor product for cooperatives, super phosphoric acid. Total tonnage of phosphate products (excluding most ammonium phosphates) fell 42 percent, nearly the same as occurred in domestic consumption. Total tonnage of mixtures and blends increased 22.4 percent, solely on the strength of increases in 18-46-0, which had a 127.1-percent increase.

While most of the surveyed cooperatives offered a multiple product line of fertilizers, only anhydrous ammonia, urea, and nitrogen solutions were sold by all (table 6). With the exception of triple superphosphate, the only offerings of the phosphate nutrient by most cooperatives were in the form of mixtures and blends. All but one of the cooperatives sold potash in the form of muriate.

On average, the three manufacturing cooperatives sold 4.1 million tons of fertilizers in 1984. That total includes the sale of products to wholesalers as well as the transfer of products into their own wholesaling or retailing operations. The average sold by cooperative wholesalers was 487,000 tons, about 10 percent the volume of the average cooperative manufacturers. This size relationship held fairly constant across fertilizer products. As a proportion of total tonnage, the nitrogen products group was relatively more important for the three manufacturers than for the 21 wholesalers (54 percent versus 41 percent). The potash (16.7 versus 23.2 percent) and blends and mixtures groups (24.3 versus 33.2 percent) were relatively less important for the manufacturers.

Among the wholesalers, sales by type of product varied widely due to differences in agricultural areas served and organizational structure. Federated regionals tended to have a higher proportion of their sales in basic and intermediate products. Their buyers, primarily local cooperatives, used these products in their own mixing and blending operations. By contrast, regionals with a more centralized structure did more mixing and blending, reflecting the difference in their product marketing role dictated by their organizational structure.

Net Sales and Share of Market

Cooperatives sold a net 15.6 million tons of fertilizer products in 1984 (excludes sales to wholesale cooperatives), representing 33 percent of U.S. consumption of fertilizer products, up from 27 percent in 1970 (table 7). Cooperatives' largest role in the fertilizer industry came in the basic materials group. Here they sold a net 10.9 million tons in 1984 for a 41-percent share, up from 36 percent in 1970. While nitrogen materials provided the largest tonnage for the survey cooperatives, they provided the largest share of consumption in potash, with 49 percent of the domestic final user market. Cooperatives increased their share of all basic materials during the 1970 to 1984 period, achieving a 38 percent share for nitrogen and a 44-percent share in phosphate.

Table 6—Number of cooperatives and average product tons sold (gross), 1984

Product	Number of co-ops		Average tons sold	
	Manufacturers Wholesalers		Manufacturers Wholesalers	
	-----Number-----		-----1000 tons Nitrogen:-----	
Nitrogen:				
Anhydrous ammonia	3	21	709.0	56.8
Nitrogen solutions	3	21	643.7	56.6
Urea (solid)	3	21	547.0	48.4
Ammonium nitrate, other	3	19	306.7	41.7
All nitrogen products	3	21	2,206.3	199.5
Phosphate:				
Phosphoric acid:				
Wet process	0	5	—	1.0
Super	1	4	(¹)	1.0
Triple superphosphate	3	19	147.0	19.2
Selected ammonium phosphate	3	4	24.0	6.8
Other	1	5	(¹)	2.4
All phosphate products	3	19	191.7	21.7
Potash:				
Muriate	3	20	(²)	109.8
Other	1	12	(²)	3.3
All potash products	3	20	679.7	113.1
Dry mixtures:				
18-46-0	3	19	687.7	78.3
Other ammonium phosphate	3	9	75.3	7.8
Other	1	15	(³)	48.5
Liquid mixtures:				
10-34-0	2	15	(³)	10.3
Other	1	14	(³)	3.9
Bulk blends	2	17	(³)	52.7
Total mixtures, blends	3	21	987.7	161.5
Total all fertilizers	3	21	4,055.3	487.1

¹Included in total phosphate, to prevent disclosure.

²Included in total potash.

³Included in total blends and mixtures.

Sales of mixtures and blends by cooperatives also demonstrated the increasing importance of cooperatives. Cooperatives gained an additional 3-percent share of the market for these products, to 23 percent, over the 1970 to 1984 period. Dry mixtures were most important in terms of total tonnage for cooperatives in the mixtures and blends group.

Marketing and Distribution Channels

Retail outlets owned by local cooperatives were by far the most important channel through which the survey

cooperatives sold fertilizer products in 1984 (table 8). These outlets received 11.4 million tons of fertilizer, representing 73.1 percent of total net sales of the survey group. Most survey cooperatives (19) sold products to local cooperative outlets.

Direct sales to end users represented the second most important channel for the survey cooperatives. Sixteen cooperatives sold 2.6 million tons of fertilizer products to end users (primarily farmers), or 16.5 percent of total net sales, mostly through branch stores owned by regionals. As might be expected, centralized cooperatives were the

Table 7—Net sales of fertilizer products and share of U.S. fertilizer consumption provided by survey cooperatives

Product	Net sales		Share of U.S. consumption ¹	
	1970	1984	1970	1984
	-----1,000 tons-----		Percent	
Straight materials:				
Nitrogen	3,820	7,498	32	38
Phosphate ²	1,069	643	(na)	44
Potash	1,106	2,719	46	49
Total	5,995	10,860	36	41
Mixtures and blends:				
Dry mixtures	3,608	3,469	na	na
Liquid mixtures	90	317	na	na
Bulk blends	553	954	na	na
Total	4,251	4,740	20	23
All fertilizers	10,246	15,600	27	33

¹Based on total consumption in the contiguous 48 states for years ending June 30.

²Phosphate data for 1970 includes unspecified quantity of 10-34-0. This product is included in liquid mixtures for 1984, conforming with USDA definitions.
(na)—not available.

Table 8—Fertilizer marketing and distribution channels, 1984

Marketing channel	Number of co-ops	Tons (1,000)	Percent of net tons	Percent of gross tons
Noncooperative suppliers:				
Manufacturers	7	141	0.9	0.6
Wholesalers	9	860	5.5	3.8
Total	12	1,001	6.4	4.4
Retail outlets:				
Local cooperatives	19	11,401	73.1	50.8
Noncooperative	6	616	4.0	2.8
Total	22	12,017	77.1	53.6
End users, direct:				
Farmers ²	16	2,572	16.4	11.5
Other	3	10	0.1	—
Total	16	2,582	16.5	11.5
Net sales ¹	24	15,600	100.0	69.5
Sales to survey cooperatives		6,826	—	30.5
Gross sales	24	22,426	—	100.0

¹Net tons equals total gross tons sold less tons sold to other cooperative wholesalers, most of which are included in the survey group.

²Primarily through regional owned branch stores.

Sales to survey

dominant users of this channel, although some federations and manufacturers sold directly to farmers.

Sales to noncooperative, nonfarmer buyers represented a minor channel for the survey cooperatives. Only 4.4 percent of gross tonnage sales went to buyers outside of the cooperative system. A large share of sales to noncooperatives probably ended up being sold to farmers.

Cooperatives in the survey sold 6.8 million tons of fertilizers to other cooperative wholesalers. Essentially all of this intercooperative sales volume originated with the three manufacturers. More than 90 percent of total tons sold by the three manufacturers went to other survey cooperatives or cooperative retail outlets. Wholesaling cooperatives sold 72 percent of their volume through local cooperative retail outlets and 22 percent directly to farmers.

The channels used by cooperatives for individual products generally followed those described above for total net tonnage. More than 77 percent of net sales of basic materials went to local cooperative retail outlets, while 13.5 percent went directly to end users (table 9). Local cooperative retail outlets were the most important for potash at 85.4 percent, followed by nitrogen, 75.6 percent, and phosphate, 67.7 percent.

In the mixtures and blends group, a similar pattern was followed, with a few variations. As was the case in phosphate basic material, sales of dry 18-46-0 to noncooperative manufacturers and wholesalers were more important relative to other products. Sales of bulk blends to direct end users were far more important (65.9 percent) than sales of other products, reflecting the smaller scale and more localized orientation of blending operations.

Wholesale Cooperative Sources of Fertilizer Products

Cooperative manufacturers were the primary source of fertilizer products sold by cooperative wholesalers and by manufacturers in their wholesale and retail operations. In 1984, the 21 cooperative wholesalers bought 76.8 percent of their total 9.8 million product tons purchased from cooperatives, primarily from the three manufacturers (table 10). While cooperative manufacturers are already the primary source for most wholesalers' products, increases in cooperative manufacturer-to-wholesaler shipments appear possible.

Wholesalers are highly dependent on cooperative manufacturers for their anhydrous ammonia, acquiring 95.5 percent of their 1.4 million tons from the three

Table 9—Marketing and distribution channels, by product, for net cooperative sales of fertilizer products, 1984

Product	Net sales	Percent of net sales to:			
		Noncooperative Manufacturers & Wholesalers	Retail outlets		Direct to users
			Cooperative	Noncooperative	
	1,000 tons		percent		
Basic materials:					
Nitrogen	7,498	8.2	75.6	1.9	14.3
Phosphate	643	11.2	67.7	8.1	13.0
Potash	2,719	0.9	85.4	2.5	11.1
Total	10,860	6.5	77.6	2.4	13.5
Liquid mixtures:					
10-34-0	253	3.1	76.3	10.3	10.3
Other	64	0.1	60.8	0.1	39.0
Dry mixtures:					
18-46-0	2,333	10.5	71.7	8.7	9.1
Other ammonium phosphates	239	4.6	72.4	17.1	5.9
Other	897	2.7	68.2	4.8	24.3
Bulk blends	954	0.5	29.5	4.1	65.9
All products	15,600	6.4	73.1	4.0	16.5

manufacturers in 1984. Wholesalers also bought about 81 percent of their total requirements of nitrogen products; nitrogen solutions, urea, and ammonium nitrates through the cooperative system.

For other fertilizer product groups, wholesaler dependence on the cooperative system is not as great. Wholesaling cooperatives acquired 71.2 percent of their phosphate products, 74.9 percent of their potash products, and 77.9 percent of their mixtures and blends through cooperatives. The importance of cooperative manufacturers beyond their manufacturing function is indicated by that fact that while they produced no potash in 1984, they still provided three-quarters of the tonnage bought by wholesalers.

Although wholesale cooperatives make heavy use of cooperative sources for fertilizer products, there remains a considerable potential for increasing cooperative-sourced tonnage. For example, if wholesale cooperatives would increase the proportion of their total purchases by 10 percent from their present 76 percent level, cooperative manufacturers could increase production by nearly 1 million tons annually. Increasing wholesaler purchases from cooperatives to the level currently achieved in anhydrous ammonia would result in a nearly 2-million ton

increase in cooperative manufacturer volume. While these calculations oversimplify the nature of wholesaler purchasing decisions, they do illustrate the magnitude of increased volume and implied cost savings that could result from tighter coordination in the cooperative fertilizer system.

PRODUCTION OF FERTILIZER PRODUCTS

Product Volume

Cooperatives in the survey produced 20.5 million tons of fertilizer and related products in 1984. They produced a total of 6.4 million tons of basic materials (anhydrous ammonia and phosphoric acid) in 1984 (table 11), or 29.8 percent more than in 1970. Nearly all basic chemical production was by CF Industries, Farmland Industries, and Mississippi Chemical Corp.

Much of the production of anhydrous ammonia and nearly all the phosphoric acid went into intermediate fertilizer production by the three manufacturers. Cooperatives' share of U.S. production of anhydrous ammonia rose 5 percent, from 20 to 25 percent between 1970 and 1984.

Table 10—Source of fertilizer purchased by cooperative wholesalers, 1984¹

Product	Total tons purchased	Source of purchases:	
		Cooperative	Noncooperative
	1,000 tons	----- Percent -----	
Nitrogen products:			
Anhydrous ammonia	1,189	95.5	4.5
Nitrogen solutions	1,200	80.8	19.2
Urea (solid)	1,151	80.8	19.2
Ammonium nitrate	570	80.7	19.3
Other	245	11.0	89.0
Total nitrogen	4,355	80.9	19.1
Phosphate products:			
Triple superphosphate	449	84.2	15.8
18-46-0	1,356	76.4	23.6
Other ²	84	25.6	74.4
Total phosphates ³	1,818	71.2	28.8
Potash materials	2,412	74.1	25.9
Mixtures and blends	462	77.9	22.1
Total all products	9,781	76.8	23.2

¹Does not include purchases by the primary cooperative manufacturers.

²Includes 10-34-0, phosphoric acids, and ammonium phosphates.

³Does not include phosphate rock.

Cooperatives' share of phosphoric acid production during the same period dropped from 28 percent to 14 percent.

Cooperatives also manufactured 5.7 million ton of related products including 1.8 million tons of nitric acid and 3.9 million tons of sulfuric acid. Shares of 1984 U.S. production of these two acids by cooperatives were 13 and 9 percent, respectively.

Cooperatives produced a total of 3.9 million tons of intermediate nitrogen fertilizer products in 1984, up 84.4 percent from the total in 1970. Urea (1.5 million tons) and nitrogen solutions (1.5 million tons) were the most important of these products. Cooperatives produced over one third of total U.S. production of solid urea and ammonium nitrate in 1984, but only 13 percent of total

U.S. production of nitrogen solutions. Ammonium sulfate, a relatively minor nitrogen product in 1970, was no longer produced by cooperatives in 1984.

Total cooperative production of intermediate phosphate products fell slightly between 1970 and 1984, from 2.96 million tons to 2.87 million tons. Production of diammonium phosphate increased significantly, however, from 1.3 million tons to 2.2 million in 1984.

Cooperatives' share of U.S. intermediate phosphate production remained lower than for intermediate nitrogen products, at a product ton weighted average of 17 percent.

Cooperative production of dry mixtures in 1984 was only a third of the 1970 production. Production of bulk blends

Table 11—Production of fertilizer materials and products by survey cooperatives, 1970 and 1984

Material or product	Production		Share of U.S. production ¹	
	1970	1984	1970	1984
	-----1,000 product tons-----		-----Percent-----	
Basic materials:				
Anhydrous ammonia	2,669	3,817	20	25
Phosphoric acid (wet process)	2,243	2,557	28	14
Related products:				
Nitric acid	1,993	1,776	18	13
Sulfuric acid	3,580	3,893	13	9
Intermediate products:				
Nitrogen Fertilizers:				
Nitrogen solutions	694	1,457	13	13
Urea (solid)	198	1,531	15	34
Ammonium nitrate(solid)	1,034	872	32	35
Ammonium sulfate	167	0	21	0
Phosphates:				
Ammonium phosphates:				
Diammonium	1,286	² 2,020	na	16
Other	269	499	na	22
Other phosphates ³	1,405	368	22	12
Mixtures and blends:				
Dry mixtures ⁴	2,366	770	na	na
Liquid mixtures ⁴	89	43	na	na
Bulk blends	582	921	na	na

¹Share of production figures are based on diluent-free or 100 percent pure product volumes, reported in the survey. Industry data is from U.S. Dep't Commerce, *Current Industrial Report*. Industry data is calendar year based, cooperative data is based on fiscal year data.

²18-46-0 only

³Includes normal superphosphates, nitric phosphates, and triplesuperphosphates in 1970. Includes only triple superphosphates in 1984.

⁴Excludes ammonium phosphates and 10-34-0.

Note: Survey cooperatives produced no potash in 1984. One cooperative owned a potash mine, but did not operate it in 1984.

increased by 58 percent over the same period. Given the variety of products in this group, production share data is not meaningful.

Number of Plants

While production of fertilizers within the survey group is centered on the three major manufacturers, several regional cooperatives have some manufacturing interests, particularly in the mixtures and blends group (table 12). Survey cooperatives operated 20 plants for the production of basic materials, 14 of which were for anhydrous ammonia. One manufacturer owned a potash facility but held it out of operation.

Cooperatives owned 40 plants for the production of intermediate fertilizers, many with locations adjacent to basic materials plants. The survey group also owned 284

mixing and blending plants, 238 of which were for bulk blends. The large number of plants and broader group of cooperative operators reflects the simpler technology, smaller capital requirements of mixing and blending operations, and the need for such plants to be near users.

Capacity and Utilization

Cooperatives increased their capacity and their share of U.S. fertilizer capacity for most products between 1970 and 1984 (table 13). Cooperative anhydrous ammonia capacity increased 52 percent, to 4.7 million tons in 1984, representing 27 percent of U.S. capacity. While cooperative phosphoric acid capacity rose nearly 68 percent to 4 million tons, their share of U.S. capacity held steady at 22 percent. Cooperatives made moderate share gains in nitric and sulfuric acid, with capacity increases of 33 and 85 percent, respectively.

Cooperative gains in anhydrous ammonia provided the pattern for their involvement in other nitrogen fertilizers between 1970 and 1984. Their capacity to produce nitrogen solutions more than doubled, with their share of industry capacity growing from 23 to 25 percent. Urea production capacity increased by 127 percent as cooperatives increased their share of capacity from 17 to 24 percent. Cooperative capacity to produce ammonium nitrate fell slightly between 1970 and 1984, as did their share of U.S. capacity. Cooperative share of ammonium phosphate capacity went from 11 percent to 31 percent on the strength of their 213 percent increase in capacity. Industry capacity data are provided in appendix table 2.

The rate at which cooperatives utilized their capacity to produce fertilizer products in 1984 varied widely from product to product. Cooperatives achieved their highest rate of capacity utilization for anhydrous ammonia and urea, both about 82 percent. Low utilization rates were indicated for ammonium nitrate, 57 percent; sulfuric acid, 60 percent; nitrogen solutions, 61 percent; and phosphoric acid, 62 percent. Capacity to produce ammonium phosphates was utilized at 71 percent and at 80 percent for nitric acid.

Industry data from The Fertilizer Institute (TFI) indicate cooperatives used their productive capacity at a lower rate than was achieved industrywide for most products².

Table 12—Number of cooperatives and cooperative owned plants producing fertilizer products, 1984

Product	Number of cooperatives	Number of plants
Basic materials:		
Anhydrous ammonia	4	14 ¹
Phosphate rock	1	1
Phosphoric acid (wet process)	3	5
Potash	1	1 ²
Related products:		
Nitric acid	4	4
Sulfuric acid	3	4
Intermediate and derivative fertilizers:		
Nitrogen solutions	4	5
Urea (solid)	4	6 ¹
Ammonium nitrate (solid)	4	3 ³
Superphosphoric acid	1	1
Triple superphosphate	2	5 ⁴
10-34-0	8	14
Ammonium phosphate	3	6 ⁴
Dry mixtures	7	15 ⁴
Liquid mixtures	10	31
Bulk blends	18	238

¹Includes one plant jointly owned with noncooperative firm.

²Idle in 1984.

³One plant was jointly owned by two cooperatives in 1984, but has since become wholly owned by one.

⁴Includes some double counting for plants that manufacture combinations of triple superphosphate, ammonium phosphate, and ammoniated NPK fertilizers.

²TFI figures for the period between June 30, 1983, and December 31, 1984, follow: anhydrous ammonia, 92 percent; phosphoric acid, 84 percent; nitrogen solutions, 89 percent; urea, 80 percent; ammonium nitrate, 85 percent; ammonium phosphates, 81 percent; and nitric acid, 88 percent.

However, care must be taken when viewing fertilizer capacity and used data. There is a lack of consensus on the definition of plant capacity and the criteria for classifying a plant as idle.

CHALLENGES FOR FERTILIZER COOPERATIVES

The economic problems faced by fertilizer cooperatives over the past 15 years, but particularly the past 5 or 6, required diligence and creativity merely to survive. The economic environment, marked by domestic industry maturity, increased concentration, international competition, poor farm sector economy, weak cooperative finances, and technological developments will challenge cooperatives even more.

Farmers have looked to cooperatives, historically, as a primary supplier of quality fertilizer products. It is most certainly their expectation that this role will continue. Thus, the challenge for fertilizer cooperatives is to position themselves as efficient and competitive fertilizer suppliers to meet the needs of farmers over the next decade and beyond. What steps must cooperatives take to assure their survival over the next few difficult years? How can the inherent conflicts between short-run survival and long-run objectives be resolved? How can each cooperative's fertilizer operations be better tailored to maximize total cooperative returns? Finally, how can the

fertilizer system of all cooperatives, taken as a group, be constructed more rationally, eliminating duplication and redundancy of assets, over-investment, and needless intercooperative competition?

Resolution of these interrelated issues will not come easily and is beyond the scope of this study. However, some general comments and suggestions are in order.

Competing in a Mature Market

The U.S. fertilizer market has increasingly shown signs of maturity, a signal for changing business strategy for cooperatives and other firms in the fertilizer industry. Growth in capacity to manufacture and distribute to a growing market is an inappropriate strategy in a stagnating market.

The future competitive environment in fertilizer will be characterized by nonprice as well as price competition, cross-subsidization of products, and multilevel multicommodity competition, with fertilizer as a single facet among many. Firms involved in fertilizer will increasingly be large and highly diversified, with involvement in farm product marketing and supply provision, as well as extensive nonagricultural operations.

Cooperatives planning to continue fertilizer production

Table 13—Cooperative production capacity to produce selected fertilizer products, 1970 and 1984

Product	Capacity		Share of U.S. capacity	
	1970	1984	1970	1984
	-----1,000 product tons-----		-----Percent-----	
Basic materials:				
Anhydrous ammonia	3,084	4,725	18	27
Phosphoric acid	2,459	4,122	22	21 ¹
Related products:				
Nitric acid	1,267	2,197	14	18
Sulfuric acid	3,503	6,464	9	11
Intermediate fertilizers:				
Nitrogen solutions	1,148	2,577	23	26
Urea (original solution)	820	1,868	17	24
Ammonium nitrate (original solution)	1,772	1,539	19	17
Ammonium phosphates	1,284	3,161	20	25 ¹

¹Share of industry capacity figures are based on nutrient ton data.

Source: Four U.S. capacity and cooperatives capacity of urea and ammonia nitrate: Tennessee Valley Authority and The Fertilizer Institute.

over the long haul must place renewed and increased emphasis on the efficiency of their existing fertilizer operations, at the plant, firm, and system level. They must view their fertilizer operations within the context of their entire system for serving farmers and agribusiness. They must examine how their fertilizer operations can contribute to their marketing and other supply operations, and vice versa.

Cooperatives must seek ways to hold and increase their market share in their traditional markets. Continued efforts to be competitive in price must be supplemented by associated services that attract and hold patrons. Cooperatives should examine ways to differentiate their fertilizer offerings from those of their competitors in terms of service, quality, and other characteristics.

Cooperatives must seek new opportunities to market their fertilizer products. New trading territories and markets, and low capital export sales must be sought. Nonagricultural markets should be examined. Equitable ways for segmenting agricultural buyers on the basis of volume must be developed. New marketing tools, such as input supplies-for-farm product trading agreements, need to be examined, especially in light of the weak financial status of farms.

Improved Vertical Coordination

Cooperatives must seek ways to increase the dedication of all parties in the cooperatives' fertilizer system toward making the system achieve its maximum potential. Considerable potential exists for regional cooperatives to increase their use of products manufactured by cooperatives. Increases of a similar nature could be made in local cooperative purchases from regional cooperatives. All parties, be they regionals, locals, or farmer members, must be encouraged to increase the proportion of their total purchases through their cooperative system. Leakages from the cooperative system, such as locals buying from noncooperative sources, must be examined, their causes identified, and solutions found.

Cooperatives must provide the economic incentives necessary to strengthen the vertical cooperative system and limit the leaks. Tie-in services, long-term contracts, exclusive supplier programs should be refined. Coordination in production, transportation, storage, and purchasing between interregionals and regionals, and regionals and locals must be improved.

Improved Horizontal Coordination

In many areas, the cooperative fertilizer system may be characterized by overlap and duplication of service and excessive and destructive competition between cooperatives. This situation, not unique to fertilizer, is perhaps the greatest threat to the U.S. cooperative system. Some degree of duplication and overlap exists at nearly all organizational and operating levels of the cooperative fertilizer system. This has several negative results, including overinvestment, underutilization of assets, inadequate scale, diversion of assets, and misdirected competition.

Through some form of horizontal coordination, cooperative manufacturers could use facilities in a more rational manner, shedding those not necessary to the system as a whole, and allocate production to the remaining plants to minimize costs under a range of operating levels and environments. Remaining plants could achieve higher rates of use while the needs of the cooperative system as a whole continued to be met.

Regional cooperative wholesalers, particularly in the Midwest, have built competing systems of distribution. Many areas are served by three or more regionals. The costs associated with this redundancy are quite high. Substantial room for improvement through coordination is quite evident.

In areas where cooperatives have largely avoided intercooperative overlap and duplication, opportunities for improving the efficiency of their distribution systems may exist also. Regionals serving adjacent areas may have opportunities to jointly operate facilities to serve patrons of both organizations.

Competition between regionals in their areas of overlap has created parallel competition among locals affiliated with each regional. The result is often that cooperatives are often focusing their efforts against each other rather than noncooperatives competitors. The result of these misdirected efforts is costly, and places severe strains on the ability of cooperatives to be efficient suppliers operating in the economic interests of farmers.

Appendix table 1—Cooperative fertilizer survey participants, 1984

Cooperative	Location of headquarters
<i>Primary manufacturers –</i>	
CF Industries, Inc.	Long Grove, IL
Farmland Industries, Inc.	Kansas City, MO
Mississippi Chemical Corp.	Yazoo City, MS
<i>Wholesalers</i>	
Agra Land, Inc.	Lansing, MI
Agway Inc.	Syracuse, NY
Alabama Farmers Co-op. Inc.	Decatur, AL
CENEX, Inc.	St. Paul, MN
Delta Purchasing Federation	Greenwood, MS
FCX, Inc.	Raleigh, NC
Gold Kist Inc.	Atlanta, GA
GROWMARK, Inc.	Bloomington, IL
Harvest States Cooperative	St. Paul, MN
Indiana Farm Bureau Co-op. Assn.	Indianapolis, IN
Intermountain Farmers Assn.	Salt Lake City, UT
Landmark, Inc.	Columbus, OH
Land O' Lakes, Inc.	Minneapolis, MN
MFA, Inc.	Columbia, MO
MFC Services, Inc.	Madison, MS
Ohio Farmers Grain and Supply Assn., Inc.	Fostoria, OH
South Dakota Wheat Growers Assn.	Aberdeen, SD
Southern Farmers Assn.	North Little Rock, AR
Southern States Cooperative, Inc.	Richmond, VA
Tennessee Farmers Cooperative	LaVergne, TN
United Purchasers Assn.	Des Moines, IA

Note: Since the time of the survey, FCX has gone out of business, with Gold Kist and Southern States taking over its operations. Agra Land, Landmark, and Ohio Farmers have joined to form Countrymark, Inc. with headquarters in Columbus, OH.

Appendix table 2—U.S. industry capacity to produced selected fertilizers, 1970 and 1984

Fertilizer	1970	1984
<i>-----1,000 tons per year-----</i>		
<i>Basic materials:</i>		
Anhydrous ammonia	16,848	17,603
Phosphoric acid (wet process)	5,991	10,635
<i>Related products:</i>		
Nitric acid	9,072	12,225
Sulfuric acid	36,492	57,120
<i>Intermediate fertilizers:</i>		
Nitrogen solutions	5,268	9,524
Urea (original solution)	4,798	7,694
Ammonium nitrate (original solution)	9,203	8,953
Triple superphosphate (nutrient)	2,035	1,870
Ammonium phosphates (nutrient)	2,748	5,928

Source: Tennessee Valley Authority, January 1984.

**U.S. Department of Agriculture
Agricultural Cooperative Service
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Agricultural Cooperative Service (ACS) provides research, management, and educational assistance to cooperatives to strengthen the economic position of farmers and other rural residents. It works directly with cooperative leaders and Federal and State agencies to improve organization, leadership, and operation of cooperatives and to give guidance to further development.

The agency (1) helps farmers and other rural residents develop cooperatives to obtain supplies and services at lower cost and to get better prices for products they sell; (2) advises rural residents on developing existing resources through cooperative action to enhance rural living; (3) helps cooperatives improve services and operating efficiency; (4) informs members, directors, employees, and the public on how cooperatives work and benefit their members and their communities; and (5) encourages international cooperative programs.

ACS publishes research and educational materials and issues Farmer Cooperatives magazine. All programs and activities are conducted on a nondiscriminatory basis, without regard to race, creed, color, sex, age, handicap, or national origin.



